

**REMARKS**

In the Office Action, the Examiner rejected claims 1 and 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,463,618 (hereinafter, "Furukawa") in view of allegedly Applicant's Admitted Prior Art (hereinafter, "AAPA"); rejected claims 2 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of AAPA and further in view of U.S. Patent No. 5,475,791 (hereinafter "Schalk"); rejected claims 3 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa, AAPA, Schalk and further in view of "Continuous Speech Recognition in Noise Using Spectral Subtraction and HMM Adaptation," 1994 (hereinafter, "Flores"); rejected claims 4, 5, 10, and 11 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa, AAPA, Schalk and further in view of "Signal Conditioning Techniques for Robust Speech Recognition," 1996 (hereinafter, "Rahim"), Flores, and allegedly well known prior art; and rejected claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Rahim and allegedly well known prior art.

By this Amendment, Applicants amend claims 1 and 7. Claims 1-12 are pending in the present application. Applicants respectfully traverse the above-noted rejections of claims 1-12 for the following reasons.<sup>1</sup>

**Rejection to Claims 1 and 7 under 35 U.S.C. § 103(a)**

Applicant's respectfully traverse the rejection of claims 1 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of APA. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference or

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<sup>1</sup> The Office Action may contain statements characterizing the related art, case law, and claims. Regardless of whether any such statements are specifically identified herein, Applicant declines to automatically subscribe to any statements in the Office Action.

references, taken alone or combined, must teach or suggest each and every element recited in the claims. (See M.P.E.P. § 2143 (8 th ed. 2001, revised May 2003).) Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. (*Id.*) Third, a reasonable expectation of success must exist. (*Id.*) Moreover, each of these requirements must “be found in the prior art, and not based on applicant’s disclosure.” (*Id.*)

Amended claim 1 is not obvious over Furukawa in view of APA because neither reference teaches or suggests each and every element of the claim. In particular, the applied references at least fail to disclose the claimed “decision means for checking, in each frame, whether or not a voice is included in the near-end speech signal... wherein said near-end speech signal includes components of the acoustic echo with a known source, the voice and an additive background noise with an unknown source,” as recited in amended Claim 1.

The Examiner admits that Furukawa fails to disclose every features claim 1 including, “using time and frequency domain information of the acoustic echo-canceled signal for checking whether or not voice is included in the microphone input signal, wherein the microphone input signal comprises background noise.” (Office Action, page 2, lines 22-24.) To cure Furukawa’s deficiencies, the Examiner, contends that “checking, in each frame, whether or not voice is included in an input signal, by using time domain and frequency domain information of an acoustic echo-canceled signal . . . is known in the art, as indicated by applicant’s allegedly admitted prior art (“APA”) at page 20, lines 16-24 of the specification.” (Office Action, pg. 3.) Applicants respectfully disagree.

The APA describes Japanese Patent Application Laid Open No. 213946/1997 as disclosing "an echo canceler which uses a double talk detection circuit that decides whether a speech is included in an input voice signal by using time and frequency domain information of source information on the input voice signal (a signal before being echo-canceled) and on an additive noise with a known source." (Specification, pg. 20, ll. 16-24 (emphasis added).) However, the APA does not teach basing the decision additionally on "an unknown source," as recited in claim 1.

Since, neither Furukawa nor the APA disclose "decision means... wherein said near-end speech signal includes components of the acoustic echo from a known source, the voice and an additive background noise from an unknown source" (emphasis added), these references, taken alone or in combination, cannot support a *prima facie* case of obviousness for claim 1. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 1 under 35 § U.S.C. § 103(a).

Claim 7, although of different scope than claim 1, recites similar features to those of claim 1. For example, claim 7 recites, *inter alia*, "a decision step... wherein said near-end speech signal includes components of the acoustic echo with a known source, the voice and an additive background noise with an unknown source." Accordingly, for at least the reasons discussed above with regard to claim 1, Furakawa and the APA, taken alone or in combination, cannot support a *prima facie* case of obviousness for claim 7. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 7 under 35 § U.S.C. § 103(a).

**Rejection to Claims 2 and 8 under 35 U.S.C. § 103(a)**

Applicant's respectfully traverse the rejection of claims 2 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa in view of APA and Schalk. As noted above, Furukawa and APA fail to teach or suggest "decision means... wherein said near-end speech signal includes components of the acoustic echo with a known source, the voice and an additive background noise with an unknown source," as recited by claim 1. Schalk also fails to overcome these deficiencies.

The Examiner apparently relies on Schalk for its disclosure of an echo-cancelled signal being used for speech recognition. (Office Action, page 3, paragraph 2.) However, Schalk does not teach the above-noted features of claim 1; nor does the Examiner rely on Schalk for such disclosure. Because, Furukawa, the APA and Schalk fail to disclose "decision means... wherein said near-end speech signal includes components of the acoustic echo from a known source, the voice and an additive background noise from an unknown source," these references, taken alone or in combination, cannot support a *prima facie* case of obviousness for claim 2. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 2 under 35 § U.S.C. § 103(a).

Claim 8, although of different scope than claim 2, recites similar features to those of claim 2. Accordingly, for at least the reasons discussed above with regard to claim 2, Furakawa, the APA and Schalk, taken alone or in combination, cannot support a *prima facie* case of obviousness for claim 8. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 8 under 35 § U.S.C. § 103(a).

**The Rejection to Claims 3 and 9 under 35 U.S.C. § 103(a)**

Applicant's respectfully traverse the rejection of claims 3 and 9 under 35 U.S.C.

§ 103(a) as being unpatentable over Furukawa, AAPA, Schalk and further in view of Flores.

As noted above, Furukawa, APA, and Schalk, taken alone or in combination, do not disclose "decision means... wherein said near-end speech signal includes components of the acoustic echo with a known source, the voice and an additive background noise with an unknown source," as recited by claim 1, from which claims 3 depends. Flores also fails to disclose these features.

Flores discloses "a scheme for robust speech recognition at very poor signal to noise ratios . . . ." (Flores, pg. I-409, Abstract.) However, Flores does not disclose, nor does the Examiner argue that Flores teaches, the claimed "decision means... wherein said near-end speech signal includes components of the acoustic echo with a known source, the voice and an additive background noise with an unknown source," as recited by claim 1.

Because Furukawa, AAPA, Schalk and Flores fail to disclose "decision means... wherein said near-end speech signal includes components of the acoustic echo from a known source, the voice and an additive background noise from an unknown source," these references, taken alone or in combination, cannot support a *prima facie* case of obviousness for claim 3. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 3 under 35 § U.S.C. § 103(a).

Claim 9, although of different scope than claim 3, recites similar features to those of claim 3. Accordingly, for at least the reasons discussed above with regard to claim 3, Furukawa, AAPA, Schalk and Flores, taken alone or in combination, cannot support a

*prima facie* case of obviousness for claim 9. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 9 under 35 § U.S.C. § 103(a).

**Rejection to Claims 4-5 and 10-11 under 35 U.S.C. § 103(a)**

Applicant's respectfully traverse the rejection of claims 4, 5, 10, and 11 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa, AAPA, Schalk and further in view of Rahim, Flores, and allegedly well known prior art.

As noted above, Furukawa, APA, Schalk, and Flores, either taken alone or in combination, do not disclose the above-noted missing features of claim 1, from which claims 4 and 5 indirectly depend. Rahim and allegedly well known prior art, as allegedly evidenced by O'Shaughnessy, pp. 229-231 or Parsons, pp. 203-205, fail to cure these deficiencies.

Rahim teaches that an "[a]coustic mismatch encountered in various training and testing conditions of hidden Markov model (HMM) based systems [which] often causes severe degradation in speech recognition performance." Rahim, pg. 107, Abstract. Rahim discloses three techniques for blind channel equalization, namely, cepstral mean subtraction (CMS), signal bias removal (SBR), and hierarchical signal bias removal (HSBR). *Id.*

However, Rahim, O'Shaughnessy and Parsons do not disclose "decision means... wherein said near-end speech signal includes components of the acoustic echo with a known source, the voice and an additive background noise with an unknown source," as recited by claim 1. Further, the Examiner does not rely on these references for such teachings.

Because Furukawa, APA, Schalk, Flores, Rahim, O'Shaughnessy, and Parsons fail to disclose "decision means... wherein said near-end speech signal includes components of the acoustic echo from a known source, the voice and an additive background noise from an unknown source," these references, taken alone or in combination, cannot support a *prima facie* case of obviousness for claims 4 and 5. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claims 4 and 5 under 35 § U.S.C. § 103(a).

Claims 10 and 11, although of different scope than claims 4 and 5, recite similar features to those of claims 4 and 5. Accordingly, for at least the reasons discussed above with regard to claims 4 and 5, Furukawa, APA, Schalk, Flores, Rahim, O'Shaughnessy, and Parsons, taken alone or in combination, cannot support a *prima facie* case of obviousness for claims 10 and 11. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claims 10 and 11 under 35 § U.S.C. § 103(a).

**Rejection to Claims 6 and 12 under 35 U.S.C. § 103(a)**

Applicants respectfully traverse the rejection to claims 6 and 12 under 35 U.S.C. § 103(a) as being rendered obvious by Rahim and "well-known prior art" for which the Examiner cited U.S. Patent Nos. 6,539,352 (Sharma), 5,742,694 (Eatwell), 6,001,131 (Raman), and 6,263,307 (Arslan) in the outstanding Office Action. Applicants note that the Examiner failed to address the arguments made with regard to these claims in the outstanding Office Action. Accordingly, these arguments are reiterated below.

Claim 6 recites “means . . . for subtracting the cepstrum mean of the non-speech frame of each talker from the cepstrum of the non-speech frame of the talker to correct multiplicative distortions that are dependent on microphone characteristics and spatial transfer characteristics from the mouth of the talker to the microphone.” See claim 6. The Examiner concedes that Rahim does not teach implementing cepstral mean subtraction on a non-speech cepstrum and concludes that it is well-known in the art to provide for estimates of non speech (or noises) in the implementation of a subtraction scheme for noise suppression citing to Sharma, Eatwell, Raman, and Arslan. (Office Action, pages 7-8.) However, the Examiner fails to identify specific teachings in Sharma, Eatwell, Raman and Arslan corresponding to the claimed “means for subtracting” as recited in claim 6. In fact, the Examiner concedes that the cited references of “well known prior art” show only estimates of non speech, but do not disclose “means . . . for subtracting the *cepstrum mean of the non-speech frame* of each talker from the cepstrum of the non-speech frame of the talker to correct multiplicative distortions that are dependent on microphone characteristics and spatial transfer characteristics from the mouth of the talker to the microphone” in the (Office Action, page 7, para. 5, emphasis added.)

Applicants remind the Examiner that M.P.E.P. § 706.02(j) states that the Examiner should not only disclose the “relevant teachings of the prior art relied upon,” but should also set forth the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter,” as well as provide an explanation of why one of ordinary skill in the art would have been motivated to make the proposed modification. Further, Applicants remind the Examiner that, pursuant to M.P.E.P. § 2143.01, “[a]lthough a prior art device ‘may be capable of being modified to run the way the apparatus is claimed, there must be a



suggestion or motivation in the reference to do so.” Here, the Examiner merely contends that one of ordinary skill in the art would have been motivated to combine the references to “provide more efficient signal enhancement of the input signal to the speech recognizer.” (Office Action at page 7.) Such unsupported assertions do not establish a *prima facie* case of obviousness with respect to claim 6.

In light of the above-described deficiencies of Rahim, Sharma, Eatwell, Raman, and Arslan, Applicants respectfully submit that the Examiner has not established a *prima facie* case for obviousness under 35 U.S.C. § 103(a). Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 6 under 35 § U.S.C. § 103(a).

Claim 12, although of different scope than claim 6, recites similar features to those of claim 3. Accordingly, for at least the reasons discussed above with regard to claim 6, Rahim, Sharma, Eatwell, Raman, and Arslan, taken alone or in combination, cannot support a *prima facie* case of obviousness for claim 12. Applicants therefore request that the Examiner reconsider and withdraw the rejection of claim 12 under 35 § U.S.C. § 103(a).

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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